



COLORADO

**Colorado Water
Conservation Board**

Department of Natural Resources

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TO: Colorado Water Conservation Board Members

FROM: Kevin Houck, Section Chief, Watershed Protection and Flood Mitigation Section
Joe Busto, Scientist Researcher, Watershed Protection and Flood Mitigation Section

DATE: November 16-17, 2016 Board Meeting

AGENDA ITEM: 9b. 2017 Projects Bill
Non-Reimbursable Project Investments "En-Bloc" Approval
(8) Water Forecasting Partnerships Project

Introduction

The Rio Grande Forecasting Project winter 2014-15 was a historic project in the United States. The CWCB and local water users partnered with NASA Aerial Snow Observatory, NOAA-National Severe Storms Lab, the National Center for Atmospheric Research, and Riverside Technologies, inc. to support the project by comparing existing water forecast methods to emerging technologies for snowpack assessment and water modeling. We also had RTI develop the NWS West Gulf RFC hydrologic modeling to put it in the hands of the DWR. Initial results were that the WRF-Hydro model was robust, the mobile radar put precipitation where it belonged for modeling, and we had a snow on flight and await a snow free flight from NASA. NASA will provide value added as they do for the California DWR.

In the Rio Grande, water forecasting is an issue and the DWR found that four of the last ten years have had large volumetric forecast errors with impacts in the millions of dollars to the water users. NCAR has a new \$1M contract with NWS-Office of Hydrologic Development to run WRF-Hydro for the nation. It is known that WRF-Hydro is superior modeling but more quality data, field projects, and optimization are needed to outperform existing methods. We will partner with forecasters on R&D to benefit compacts, apportionment, and beneficial use in Colorado.

Traditional snow data at a few discrete points will not serve us well now or in the future. Nor will reliance on historical data sets to estimate the water volume numbers today. We need to partner and force the future by developing more accurate data and modeling for a better way of doing business. This project request builds on success in the Rio Grande with plans to work with the agencies to implement projects in other watersheds. Dick Wolfe has stated there is a general need for better forecasting statewide and Nathan Coombs of the Conejos Water District said, "Working with these experts and the new science has absolutely put more water at the head gates of our users."

Staff Recommendation

Staff recommends the Board request the General Assembly to appropriate \$800,000 from the Construction Fund to the Department of Natural Resources for use by the CWCB for the continuation of the Water Forecasting Partnerships Project.





Water Forecasting Partnerships Project

Colorado Water Conservation Board

November 2016 Board Meeting

The Rio Grande Forecasting Project was a historic end-to-end field demonstration project that illustrated 21st century science will lead to better water management in Colorado and is ongoing. The new federal national water model with new data and calibration will give more accurate water supply forecast numbers leading to better administration and apportionment among all the competing interests. In yellow is staffs plan to spend the existing \$300K. In blue is staff's plan to spend \$600K for water forecasting work in FY 2017-18. There is a total of about \$1.4M in project ideas listed.

PROJECT DETAILS

Project Cost: \$800,000 (matching will be sought)

NRI Funding Request: \$800,000

Funding Source: Construction Fund

Project Type: Data and Modeling Upgrades

Type of Grantee: Funding for Partnerships

LOCATION

Benefits: Statewide

Water Source: Various

Drainage Basin: All Basins

FY 2016-17 – Existing Funding			
Location	Item	Cost	Notes
Rio Grande	NASA ASO April 1 flight Rio Grande	110,000	Third year of snowpack flights in Rio Grande
Rio Grande	NOAA Mobile radar Dec-March	70,000	NOAA radar in Rio Grande matches up with GOES-R satellite mission
Rio Grande	NCAR modeling & site installs	50,000	National water model forecasts and field work
Grand Mesa	NRCS SNOTEL	17,500	Partner on SNOTEL for water forecasts and landslide
Rio Grande	Snow data & Model with USGS	30,000	USGS matching funding for snow data above Creede
statewide	soil moisture radiation sensors	20,000	NRCS installs makes national water model better
statewide	Field Work /Travel	5,000	West Gulf RFC, AMS Conference, Inspect radars
		302,500	

Proposed WY 2017-2018			
Location	item	Cost	Notes
statewide	Put DWR gauges in WRF-Hydro	70,000	NCAR does work WRF-Hydro only has USGS gauges in it
statewide	soil & solar radiation sensors	35,000	NRCS installs makes WRF-Hydro better
Arkansas	Radar QPE +WRF Hydro forecasts	120,000	NOAA radar data & NCAR does experimental forecasts
Rio Grande	National water model experimental forecasts	35,000	NCAR continues to provide experimental forecasts
western slope	database for CSAS	40,000	online CSAS data for analysis and modeling
statewide	Field Work /Travel	5,000	CBRFC, AMS Conference, See mobile radar
Gunnison Basin	NASA ASO mapping	200,000	Expands existing project to just Taylor \$100K in local funding needed
statewide	purchase PX10,000 mobile radar	300,000	\$300,000 Homeland security matched with CWCBC
		805,000	

Proposed WY 2018-2019			
Location	Item	Cost	Notes
South Platte	Radar QPE +WRF Hydro forecasts	120,000	NOAA develops radar data & NCAR does experimental forecasts
Arkansas	Two SNOTEL sites	35,000	Arkansas partners on two of six requested SNOTEL sites
Rio Grande	new SNOTEL	17,500	Rio partners on requested SNOTEL site
Statewide	Field work/travel	5,000	RFC meetings, AMS Conference, AGU conference
		\$177,500	

Unmet Needs			
Location	Item	Cost	Notes
SNOTEL in Rio Grande	SNOTEL in Rio Grande	17,500	NRCS installs and maintains
Rio Grande	USGS data support	30,000	Can only fund one year of USGS effort right now
CSAS	continue CoDos work	40,000	CoDos in Severance Tax too many years now
South Platte	USGS UAV snowpack mapping	93,000	USGS not funded through Severance Tax
Travel to meetings	Field work/travel	5,000	RFC meetings, AMS Conference, AGU conference

\$185,500

Total \$1,470,500